Honeywell

Operation and Service Manual

for onecal

TS 13100 / TS 13101 / TS 13102 / TS 13104 / TS 13108

Intrinsically Safe Digital Thermometer

Note: before using the instrument please read this book.

This document is subject to changes without notice.
Check updates on www.tanksystem.com or contact us at tanksystem@honeywell.com

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2. General information

2.1 Disclaimer

This manual is designed and written to provide information with regard to the subject matter involved. Enraf Tanksystem SA makes no warranty, express or implied, that it is fit for any purpose whatsoever; or to the absolute sufficiency of the material presented.

Enraf Tanksystem SA assumes no responsibility for any inaccuracies in reproduction or errors in interpretation of any authority. Enraf Tanksystem SA reserves the right to modify or amend this manual, without prior notification, but Enraf Tanksystem SA assumes no responsibility to update or issue corrections.

2.2 Shipment note

The following parts should be included in the shipment:

- 1 instrument;
- 1 battery in the electronic box or separate;
- 1 carrying belt;
- 2 Allen keys (1.5 mm and 2 mm);
- 1 Operation and Service Manual;
- 1 Quick Reference Pocket Guide.

2.3 Initial inspection

Check the contents of the shipment for completeness and note whether any damage has occurred during transport. If the contents are incomplete, or if there is damage, do not use the device. A claim should be filled out with the carrier immediately, and Enraf Tanksystem SA Sales or Service organisation should be notified in order to facilitate the repair or replacement of the instrument.

2.4 Documentation discrepancies

The design of the instrument is subject to continuous development and improvement. Consequently, the instrument may incorporate minor changes in detail from the information contained in the manual.

2.5 Warranty

24 months after delivery ex works.

The Vendor undertakes to remedy any defect resulting from faulty design, materials or workmanship. The Vendor's obligation is limited to the repair or replacement of such defective parts by his own plant or one of his authorised service stations. The Purchaser shall bear the cost and risk of transportation of defective parts and repaired parts supplied in replacement of such defective parts.

This warranty does not apply to those items which by their nature are subject to deterioration or consumption in normal service, and which must be cleaned, or replaced on a routine basis.

When returned to Enraf Tanksystem SA equipment must be contamination-free. If it is determined that the Purchasers equipment is contaminated, it will be returned to the Purchaser at the Purchasers expense. Contaminated equipment will not be repaired, replaced, or covered under any warranty until such time that the Purchaser decontaminates the said equipment.

The Purchaser shall notify by fax, telex or in writing of any defect immediately upon discovery, specifying the nature of the defect and/or the extent of the damage caused thereby.

Where no other conditions have been negotiated between the Vendor and the Purchaser "General Conditions 188" of United Nations shall apply.

This instrument has been certified as Intrinsically Safe Instrumentation for only those classes or categories of hazardous areas stated on the instrument label, bearing the mark of the applicable approval authority. No other usage is authorised.

Abuse including rough handling, mechanical damage, electrical damage, operation, alteration, or unauthorised repair or component replacement by the Purchaser will void this guarantee and may

impair the intrinsic safety of the instrument. In particular it is not allowed to repair electronic circuits.

This warranty is expressly in lieu of any and all other warranties and representations expressed or implied, and all other obligations or liabilities on the part of the Vendor (Enraf Tanksystem SA) including but not limited to, the warranty of merchantability or fitness for a particular purpose.

In no event shall Enraf Tanksystem SA be liable for indirect, incidental or consequential loss or damage or failure of any kind connected with the use if its products or failure of its products to function or operate properly.

Enraf Tanksystem SA do not assume the indemnification for any accident or damage caused by the operation of its product and the warranty is limited to the replacement of parts or complete goods.

2.6 Certification

Enraf Tanksystem SA is an ISO 9001 certified company by Intertek.

The equipment has been approved for the electrical intrinsic safety by the following authorities:

Europe: BASEEFA
BAS 00 ATEX 1014X/1
II 1 G Ex ia IIB T4 Ga

USA: Factory Mutual
Class I, Division 1, Groups C&D, T4
Class I, Zone 0, AEx ia IIB T4

International: BASEEFA
IECEx BAS 12.0031X
Ex ia IIB T4 Ga

China: NEPSI
GYJ12.1052X
Ex ia IIB T4 Ga

Russia:
GOSGORTECHNADZOR 0ExiaIIBT4X

If you need any specific certificate please contact:

Enraf Tanksystem SA
Rue de l'industrie 2
1630 Bulle, SWITZERLAND

Telephone : +41-26-91 91 500
Telefax : +41-26-91 91 505
E-mail : tanksystem@honeywell.com
Web site : www.tanksystem.com

2.7 Spare parts

When ordering spares identify the spare part by TS number and description. Refer to section 10.2.

Some spares might be repairable; in this case send the part(s) to any authorised service center or to the factory.

In case of urgency, complete replacement units can be made available. Contact the factory or nearest Service Station for details.

2.8 Service and Repair

The customer is responsible for any freight and customs clearance charges. If units are sent on a "freight collect" the charges will be invoiced to the customer.

When returning units or parts for repair to the factory please fill out a service request form (see next page). The serial number (OXnnn) and the year of production (nnnn) are printed on the rear of the electronic box

When returned to Enraf Tanksystem SA equipment must be contamination-free. If it is determined that the customers equipment is contaminated, it will be returned to the customer at the customers expense. Contaminated equipment will not be repaired until such time that the customer decontaminates the said equipment.

Service Request

Customer's address: .....
.....
.....
.....
Contact name:.....

Telephone: .....

Telex: .....

Fax: .....

Type of unit or part: .....
.....

Serial number: ...O.....Year:.....

Short description of trouble: .....
.....
.....
.....

Do you want a quotation before repair is started:.....yes / no.....

Repaired unit has to be returned to the following address:
.....
.....
.....
For the Attention Of:
.....

3. Worldwide Service Stations network

The updated list can be found on our website www.tanksystem.com

COUNTRY	ADDRESS	TELEPHONE/FAX/E-MAIL
SWITZERLAND	ENRAF TANKSYSTEM SA 2, rue de l'Industrie CH-1630 BULLE	Tel : +41-26-91 91 500 Fax : +41-26-91 91 505 Tanksystem@honeywell.com
CANADA	PYLON ATLANTIC A Div. Of Pylon Electronics Inc. 31 Trider Crescent., DARTMOUTH, N.S. B3B 1V6	Tel : +1-902-4683344 Fax : +1-902-4681203 halifax_csr@pylonelectronics.com
CHINA	HUA HAI EQUIPMENT & ENGINEERING CO LTD Factory 7, Lane 1365, East Kang Qiao Road Kang Qiao Industrial Zone, Pu Dong SHANGHAI, P.C. 201315	Tel : +86-21-68183183 Fax : +86-21-68183115 huahaish@huahaiee.com
GERMANY	CHRISTIAN BINDEMANN MARINE TECHNICAL SERVICES Antonie-Möbis-Weg 4 HAMBURG 2523	Tel : +49-40-41918846 Fax : +49-40-41918847 service@mkecb.com
GREECE	SPANMARIN 86, Filonos Street GR-185 36 PIRAEUS	Tel : +30-210-4294498 Fax : +30-210-4294495 spanmarin@ath.forthnet.gr
JAPAN	DAIWA HANBAI CORPORATION LTD 2-10-31, Mitejima, Nishiyodogawa-ku OSAKA 555-0012	Tel : +81-6-64714701 Fax : +81-6-64729008 daiwa471@silver.ocn.ne.jp
KOREA	World Ocean CO., LTD Rm1001, Hae-deok Bldg., 1212-11 Choryang-dong Dong-Gu BUSAN	Tel : +82-51-462-2554/5 Fax : +82-51-462-0468 info@worldocean.co.kr
MEXICO	URBAN DEL GOLFO SA DE CV Julian Carrillo No. 709 Nte. COL. LOS MANGOS 89440 Cd. MADERO, Tamps, MEXICO	Tel : +52-833-2170190 Fax : +52-833-2170190 urbansa@prodigy.net.mx
NETHERLANDS & BELGIUM	B.V. TECHNISCH BUREAU UITTENBOGAART Brugwachter 13 NL-3034 KD ROTTERDAM	Tel : +31-10-4114614 Fax : +31-10-4141004 info@tbu.nl

The updated list can be found on our website www.tanksystem.com

COUNTRY	ADDRESS	TELEPHONE/FAX/E-MAIL
PORTUGAL	CONTROLIS, Lda. Rua Conceição Sameiro Antunes, 26-E Cova da Piedade 2805-122 – Almada	Tel : +351-21-2740606 Fax : +351-21-2740897 controlis.port@gmail.com
RUSSIA	NPP "GERDA" Vilisa Latsisa str. 17 Building 1 125480 MOSCOW	Tel : +7-495-7558845 Fax : +7-495-7558846 info@gerda.ru
SINGAPORE	HUBBELL INT'L (1976) PTE LTD 322 Thomson Road SINGAPORE 307665	Tel : +65-6-2557281 Tel : +65-6-2550464 Fax : +65-6-2532098 hubbell@mbox2.singnet.com.sg
SPAIN	E.N.I. Electronica y Neumatica Industrial, S.A. C/Jon Arrospide, 20 (Int.) 48014 BILBAO	Tel : +34-94-4746263 Fax : +34-94-4745868 eni.tecnica@eni.es
SWEDEN	INSTRUMENTKONTROLL Lars Petersson AB Varholmsgatan 1 414 74 GÖTEBORG	Tel : +46-31-240510 Tel : +46-31-240525 Fax : +46-31-243710 Info@instrumentkontroll.se
TURKEY	YEDI DENIZ Setustu, Izzetpasa Yok.1 TR 34427 Kabatas ISTANBUL	Tel : +90.212.251 64 10 / 3 lines Fax : +90.212.251 05 75 servicestation@yedideniz.net dmgistanbul@yahoo.com
UNITED ARAB EMIRATES	MARITRONICS TRADING L.L.C. P.O. Box 6488 Shed # 72, Jadaf Ship Docking Yard DUBAI	Tel : +971-4-3247500 Fax :+971-4-3242500 service@maritronics.com
UNITED KINGDOM	ENERGY MARINE (INTERNATIONAL) LTD. 12 Clipstone Brook Industrial Estate Cherrycourt Way LEIGHTON BUZZARD, BEDS, LU7 4TX	Tel : +44-1525-851234 Fax :+44-1525-852345 info@engmar.com
U.S.A / TEXAS	HONEYWELL HERMETIC 4522 Center Street DEER PARK, TX 77536	Tel : +1-281-930 1777 Fax : +1-281-930 1222 Toll free call in the USA: 1-800-900 1778 hermetic@honeywell.com

4. Recommendation for safe use

1. This Operation and Service Manual is a guide in order to help the user to operate the instrument safely and correctly.

2. Nevertheless the maker disclaims all responsibility and liability for damage resulting from the use of the equipment regardless of the cause of the damage.

3. **Attention is drawn to the possible hazard due to the fact that this equipment is to be used under open tank gauging conditions**. Therefore the operator may be exposed to vapors and/or liquid splash. One must wear the personal protective equipment appropriate to the liquid the temperature of which is to be measured. Refer to the appropriate Material Safety Data Sheet (MSDS) and/or other site specific instructions.

4. **Attention is drawn to the possible hazard due to electrostatic charges which may be present in the tank.** This may happen in particular with static accumulator liquids, i.e. liquids that have low conductivity of 50 picoSiemens/metre (pS/m) or less.

5. **It is very important that the instrument is earthed to the tank before the probe is introduced into the tank, and remains grounded until after complete withdrawal from the tank. The instrument should be grounded by means of the grounding cable and clip provided.**

6. **It is anticipated that the user will have specific operating methods laid down to ensure safety when using this type of apparatus. In this case the user's instructions shall be strictly observed.**

7. **In the absence of such instructions the following should be noted:**

   7.1. If the sensor probe is to be lowered into the tank via a grounded metal stilling well or sounding pipe that reaches below the liquid surface, or if the tank has a floating roof that is fully floating (and is in electrical continuity with the tank shell), then measuring the temperature is permissible at any time with no restriction.

   7.2. In any other circumstances where a flammable vapor may be present, the following precautions should be taken:

      7.2.1. If the cargo is not a static accumulator liquid, i.e. its conductivity is more than 50 pS/m, then measuring the temperature is permitted provided that the instrument is properly grounded and earthed before the temperature probe is inserted into the tank and remains earthed until the temperature probe has been removed from the tank.

      7.2.2. If the cargo is a static accumulator liquid, i.e. its conductivity is less than 50 pS/m, then measuring the temperature is permitted provided that:

         7.2.2.1. The instrument is properly grounded and earthed before the temperature probe is inserted into the tank and remains earthed until the temperature probe has been removed from the tank, and-

         7.2.2.2. The apparatus is not introduced into a tank until at least 30 minutes have elapsed after completion of any loading or mixing operation or stopping the injection of inert gas.

   7.3. For further guidance refer to International Safety Guide for Oil Tankers and Terminals (ISGOTT), ISBN 1 85609 291 7, Fith Edition 2006 or consult the appropriate Legislative Authority for the installation.

8. **Warning: Substitution of components may impair the intrinsic safey.**
   Change the battery only in a safe area; Use only an approved battery.
   To prevent ignition hazard, avoid impact or friction of the device aluminium box.

9. **This product and its use is / may be related to international, national, local or company regulations or standards. It is the customer / user responsibility to ensure that the way to use the device complies with such applicable regulations or standards.**

5. Description

5.1 A smart thermometer

5.1.1 General

The onecal thermometer is a hand-held portable digital instrument of the latest generation, designed specifically for use in hazardous locations with outstanding characteristics regarding safety, accuracy, ease of operation, reliability and cost efficient maintenance. It is very user friendly and easy to calibrate:

- the onecal is modular; the exchange of parts is extremely easy and cost efficient. No special training or tools are required.
- changing the cable does not require the instrument to be re-calibrated,
- changing the sensor requires only an offset calibration, i.e. the ice point calibration

5.1.2 One point calibration

Temperature calibration and verification are the most important points for keeping a good accuracy, but in most cases these procedures involve costly equipment, are time consuming and therefore quite expensive.

onecal stands for: one reference point only for calibration. No special tool or training is required for calibrating this thermometer.

The temperature/resistance curve of the Platinum Resistance Temperature Detector (Pt-RTD) is digitally stored in a micro-controller and cannot be changed by the user. The relationship between resistance and temperature is then used to calculate the temperature reading.

Therefore the calibration consists of the adjustment of the offset scale value at 0,0 °C. This reference point is the water triple point (ice point), which can be easily and universally reproduced. See 7.7.3.

During the calibration procedure the onecal automatically checks the accuracy and stability of the reference temperature. In other words the onecal will not accept a new calibration if this is not done properly.

5.1.3 High standard in accuracy, repeatability and reproducibility

The onecal thermometer is specifically designed to meet the highest accuracy standards (ISO 4268, API Manual of Petroleum Measurement Standards Chapter 7) that are commonly accepted best oil industry practice.

The goal of the measuring routine is to determine as accurately as possible the Pt-RTD resistor value and to calculate the corresponding temperature.

For achieving such a high standard in accuracy, repeatability and reproducibility the resistance of the cable and instrument electronics is continuously measured and compensated for, i.e. a variation of the cable or circuitry resistance due to temperature change does not affect the accuracy and a cable change does not require a new calibration.

The measurement routine is totally under the control of the micro-controller.

A high precision resistor is used as the reference to calibrate the measuring chain.

Figure 1 shows the main features of the onecal.

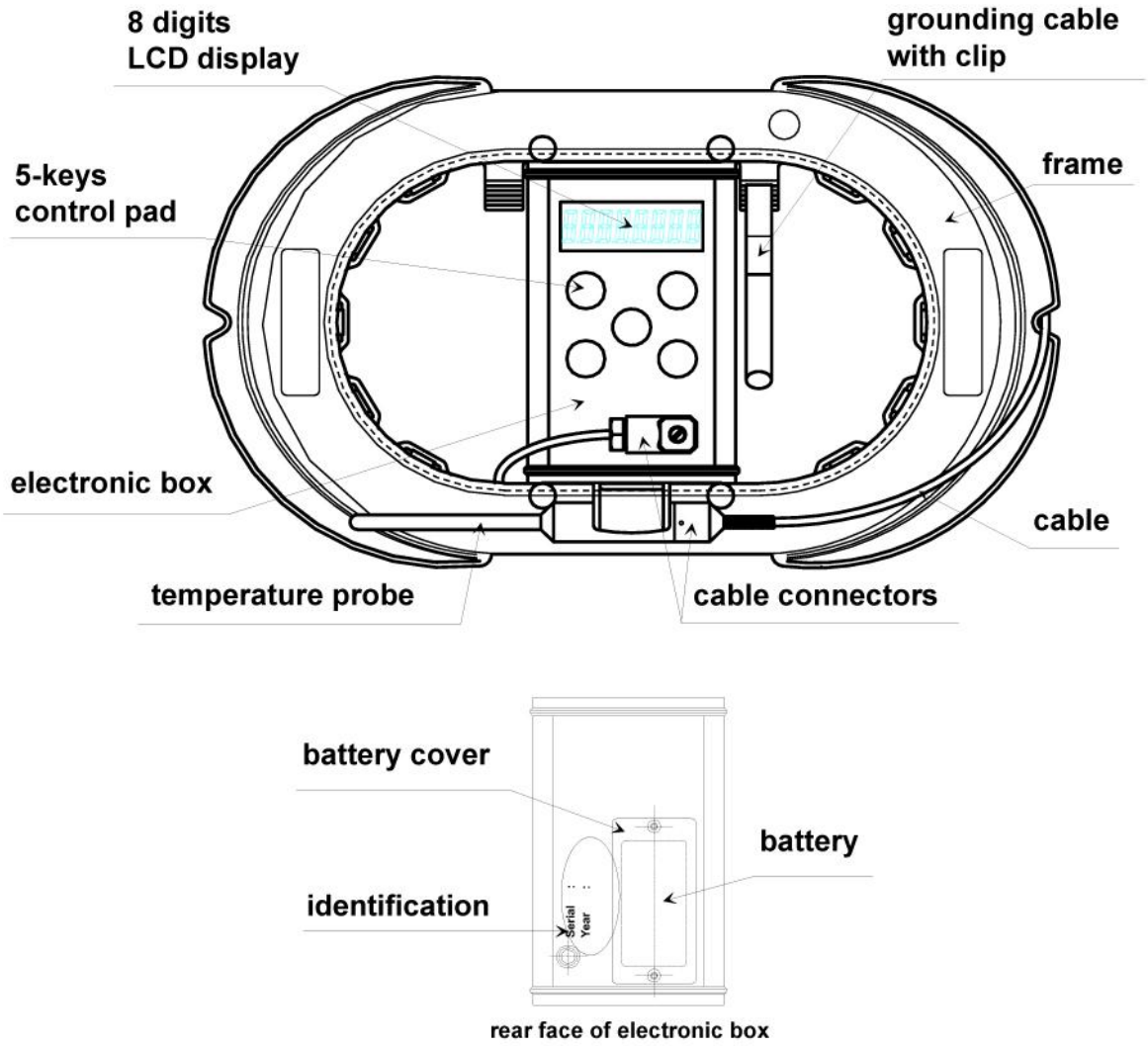

8 digits
LCD display
grounding cable
with clip
5-keys
control pad
frame
electronic box
cable
temperature probe
cable connectors
battery cover
battery
identification
Serial
Year
rear face of electronic box

Figure 1

5.2 Grounding cable with clip

This device is very important for the safe operation of the instrument. As static electricity can cause an explosion if a flammable vapor is present, it is mandatory to ground the onecal by means of the grounding cable and clip. Refer to section 3.

5.3 Sensor

5.3.1 Temperature probe

The temperature probe is a Platinum Resistance Temperature Detector (Pt-RTD) located close to the end of the protective probe sheath. This Pt-RTD constitutes the core of the thermometer; and it is therefore specially selected in order to ensure only those individuals that perform to a very strict specification and show the highest level of accuracy, long term stability and reliability over the range of temperature are used.

5.3.2 Resistance and response time

The sensor is specially designed to combine a very good shock resistance, with a 6 mm diameter probe sheath, and a quick response time.
It is made in stainless steel to withstand most aggressive chemicals.
The onecal has a typical response time (time to achieve 90% of a step change in temperature) of less than 15 seconds in water and 35 seconds in lubricating oil, under dynamic conditions.

5.3.3 Connection to the cable

The sensor is equipped with a genuine connector, thus connecting it to the cable could not be more easy. There is no need for special tools, soldering, sealing, etc.
Just plug in and go!

5.4 Load for viscous liquids (option)

A special extra load (300 g) can be provided as an option, in case very viscous liquids are measured. It is very easy to install. Two screws (Allen key 2 mm) secure it on the sensor .

Order Number TS 13071 (load delivered with its holder kit to fix on the cable holder)

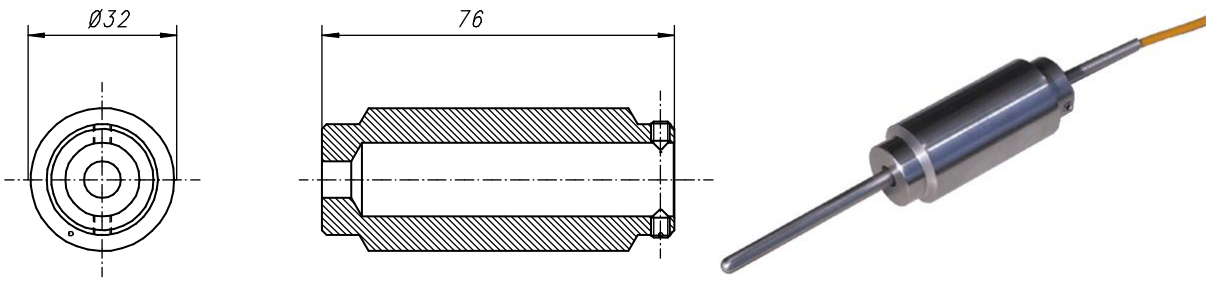


Figure 2

5.5 Cable and frame

This is a shielded coaxial two conductors cable, with an FEP jacket that withstands most chemicals.
It can be easily disconnected from both the sensor and the electronic box if it needs to be replaced.
The replacement of the cable does not necessitate the recalibration of the onecal, as its resistance is automatically checked and balanced by the micro-controller. See also section 5.6.
The frame is made in antistatic polyamide. It is ergonomic and rugged for easy and safe cable storage.

One loop is approximately 0.7 m (2 ft 3"), 1.5 loop is approximately 1 m (3 ft 4"), so it is easy to correctly position the sensor at the desired positions within the tank contents by simply counting the number of cable loops unwound. See also section 6.8.

Note: the cable cannot be dismounted or removed from the frame, see 7.3.

5.6 Electronic box

The electronic box contains the 5-keys control pad, the display and a circuit board. It is powered by a 9V battery.
It is protected against dust and splashing water as per the IEC 529 standards (IP54).
By pressing the 5-key control pad the user can select the temperature scale, the operating mode, and store up to 9 temperature measurements, or calculate the average temperature on selected data. See also section 6.
The approved batteries are:

- Zinc Carbon or Zinc Chloride: 6F22 or 6F22P
- Alkaline Manganese: 6LR61, Duracell MN1604/ Procell PC1604

5.7 Carrying belt

The onecal is supplied with a special carrying belt.

Figure 3

Figure 4

5.8 Carrying box (option)

Available in option, this special box is fully cushioned and prevents the onecal of damage during storage or carrying.

Order Number is TS 13064.

Figure 5

Figure 6

6. Operation

6.1 Safety

6.1.1 Personal Protective Equipment

Appropriate safety precautions should be taken according to the hazard and toxicity of the liquid the temperature of which is to be measured. The purpose of the personal protective equipment is to prevent a hazardous material from coming into contact with the body, either directly to the skin or eyes, through inhalation of vapors or mists or by absorption through the skin.
Appropriate respiratory protection and head, face, hand and foot protection shouls be worn prior to opening the hatch and using the onecal.

6.1.2 Grounding the equipment

Before opening the tank hatch attach the grounding clip to an electrically conductive grounded structure. Make sure that the surface which the clip is in contact with is electrically conductive.
The onecal shall be grounded until complete withdrawal of the temperature probe from the tank and closure of the hatch.
Refer to section 3.

6.2 Installing the battery

THIS MUST BE DONE ONLY IN A SAFE AREA.

(1) Unscrew the 2 screws of the battery cover located at the rear face of the electronic box.
(2) Check that the battery is approved, i.e. Duracell MN1604/ Procell PC1604 or any 6F22 or 6F22P.
(3) insert the battery.
(4) Put the cover back and tighten the screws.

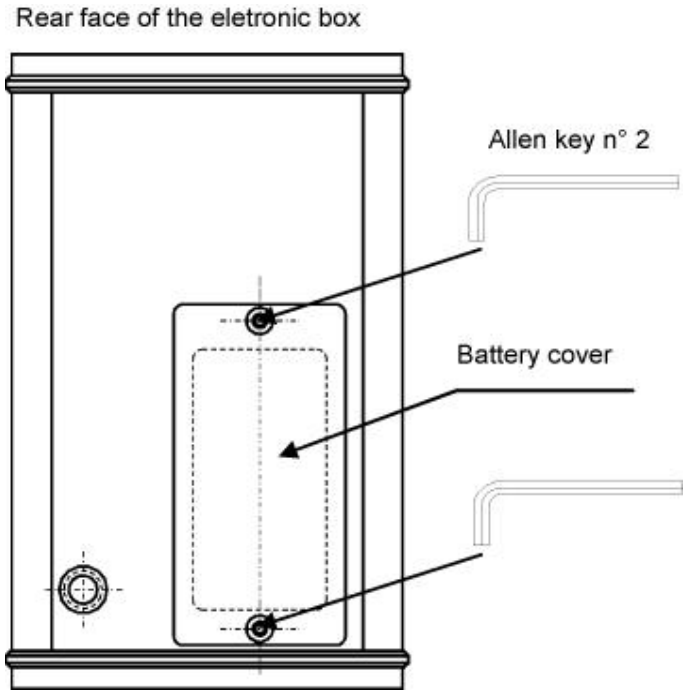


Figure 7

6.3 Basic rules concerning the 5-key control pad

enter (E) : activate the function
on / off : switch on / off
+ : go into the menu or yes
- : quit the menu or no

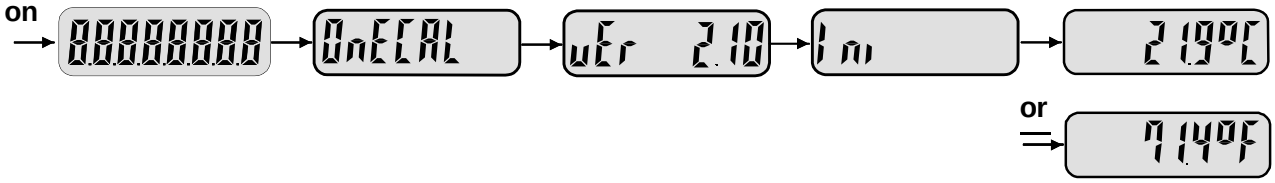
Keep the commands pressed until the action is displayed.
The "off" key is not active in all menus.
Press "-" to leave those menus before switching off the onecal.

6.4 Basic rules concerning the display

The degree mark "°" is regularly blinking in the measurement mode.
The display is refreshed every second in the measurement mode.
All other modes showing saved temperatures do not display the degree mark "°".
The display is blinking when the temperature is between 163 °C (325 °F) and 200 °C (392 °F).

6.5 Switching on the thermometer

Press "on". The following sequence is displayed automatically.



The onecal is now ready for measuring the temperature, that is displayed and refreshed every second.

6.6 Automatic shut off

If there is no action on the onecal keyboard during 10 minutes the thermometer switches off automatically.

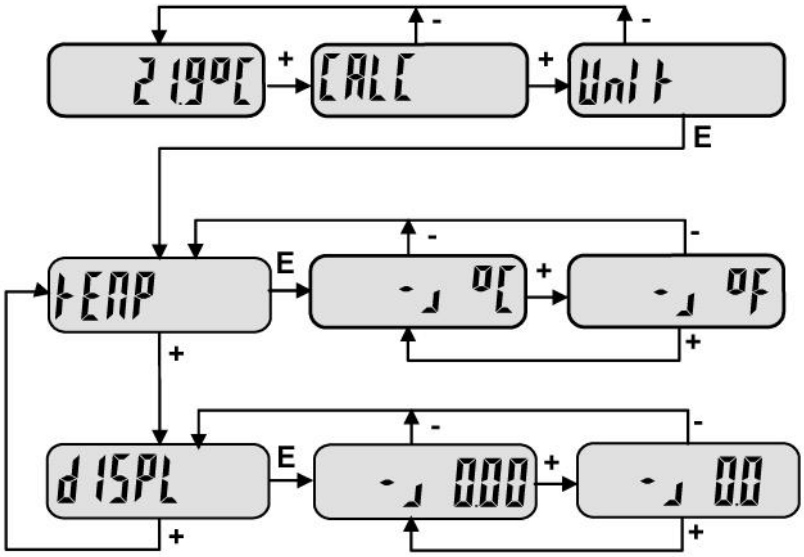
6.7 Changing the temperature scale C/F or the resolution 0.1° / 0.01°

Press "+" twice, then "enter".

Press "+" to switch from the temperature scale mode to the resolution mode.

Temperature °C or °F: when "Temp" is displayed press "enter", then "+" to chose the scale. Press "-" 3 times to return to the measurement mode.

Resolution 0.1° ou 0.01°: when " displ" is displayed press "enter", then "+" to chose the resolution. Press "-" 3 times to return to the measurement mode.



6.8 ***Ullage distance***

An ***approximate*** relation between the number of loops and the distance is given in the following table:

Distance (m)	Number of loops	Distance (ft)
0,67	**1**	**2ft 3"**
1	1.5	
	2	4,5
2	**3**	
	5	11
4	6	
	8	18
6	9	20
	11	24,5
8	12	
	14	31
10	15	
	16	36
12	18	
	19	42
	21	46.5
15	22	
	23	51
	24	54
17	25	
19	28	62
	30	66.5
21	31	
	32	72
	33	73
23	34	
	35	77.5
25	37	82
27	40	89
	42	93
29	43	
	44	97.5
31	46	
	47	104
33	49	108.5
	51	113

6.9 Taking a temperature reading

Make sure that the onecal is properly grounded. See sections 3 and 6.1.

Take the temperature probe and place it in the liquid to be measured.

6.9.1 Range up to 163 °C (325 °F)

Select the location(s) at which measurements are to be made in accordance with established best oil industry practice (ISO 4268, API Manual of Petroleum Measurement Standards Chapter 7), and lower the sensor probe to the required level(s) by counting the number of cable loops unwound (Refer to section 6.8) to reach the required ullage distance(s).

At each measurement location, raise and lower the probe by half a cable loop above and below the predetermined level to allow rapid equilibration of the sensor with the surrounding liquid.

Observe the display and wait until the reading has stabilized before recording it or saving it (see section 6.10). The probe may be considered to have reached equilibrium with the surrounding liquid when the indicated temperature has not changed by more than 0,1°C in approximately 30 seconds.

If the temperature does not stabilize, continue to raise and lower the probe in the liquid for a longer time; and make sure that the lack of stability is not caused by the liquid itself.

If multiple spot temperatures are required, repeat the procedure at each of the other predetermined levels.

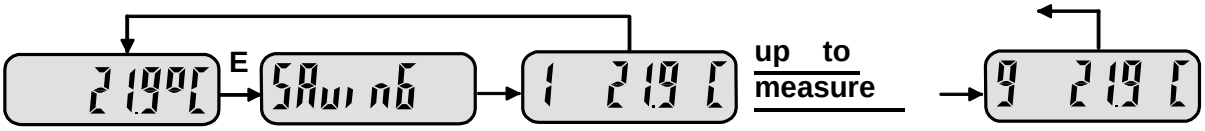
Note: when the extra load is used (refer to section 5.4), the time to reach equilibrium is longer.

6.9.2 Range over 163 °C (325 °F)

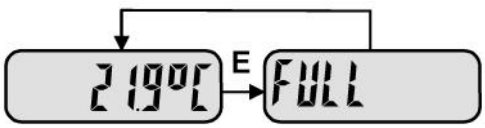
In that range only surface temperatures are allowed, i.e. immersing the sensor by maximum 10 cm or 4 inches. In that range the display of the temperature is blinking.

6.10 Saving the current temperature

From the measurement mode press "enter" to save the temperature. The index in the memory appears on the left of the LCD display, as follows.



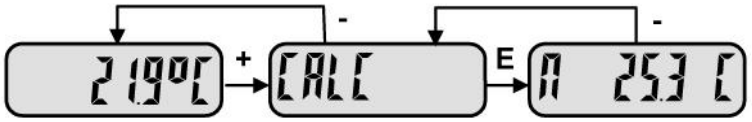
Up to 9 individual measurements can be stored.
If 9 measurements are already stored, the memory is full and the following screen is displayed:



After saving, the thermometer returns automatically to the measurement mode.

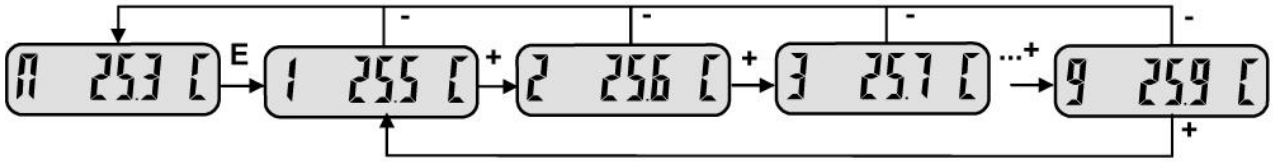
6.11 Showing the average temperature

From the measurement mode, press "+", and then "enter", to display the average temperature.



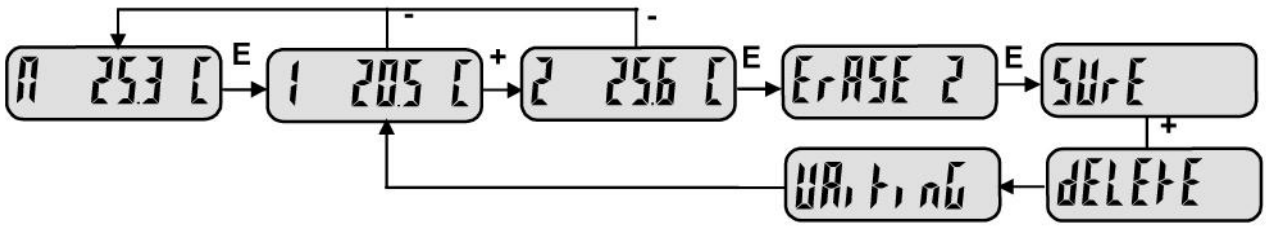
6.12 Scrolling up the saved data

From the average temperature display, press "enter", and then by pressing "+", scroll up the saved data.



6.13 Deleting one data point

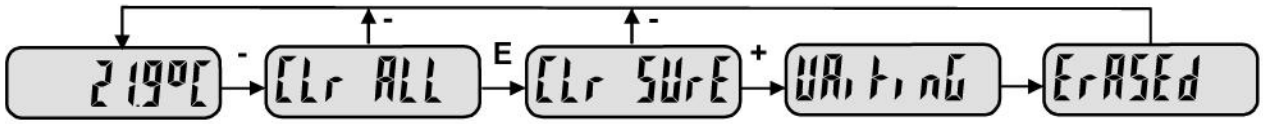
It is possible to delete one or more data point(s), one by one.
From the average temperature display, press "enter", then "+" as many times as necessary to get the data point to delete, then press "enter". Press "enter" again to erase. Press "+" to confirm. See below an example where data point n°2 is deleted.



The onecal recalculates the average temperature of the remaining data.

6.14 Erasing all data

To clear the memory, i.e. erasing all the saved data (up to 9 individual data points), from the measurement mode press "-", then "enter", and then "+".



7. Care and maintenance

7.1 Care

Clean the instrument of any excess of liquid after each use. Wipe the cable after each use.

Check regularly the continuity of grounding by measuring the electrical resistance between the sensor and the clip of the grounding cable. The resistance should not exceed 10 ohm.

Check regularly the sensor, the cable and the grounding cable for any kink, scratch, cut or other visible damage.

Store the equipment in a dry location.

7.2 Changing the battery

THIS MUST BE DONE ONLY IN A SAFE AREA.

(1) Unscrew the 2 screws of the battery cover located at the rear face of the electronic box.
(2) Replace the battery. Use only approved batteries, i.e. Duracell MN1604/ Procell PC1604 or any 6F22 or 6F22P.
(3) Put the cover back and tighten the screws again.

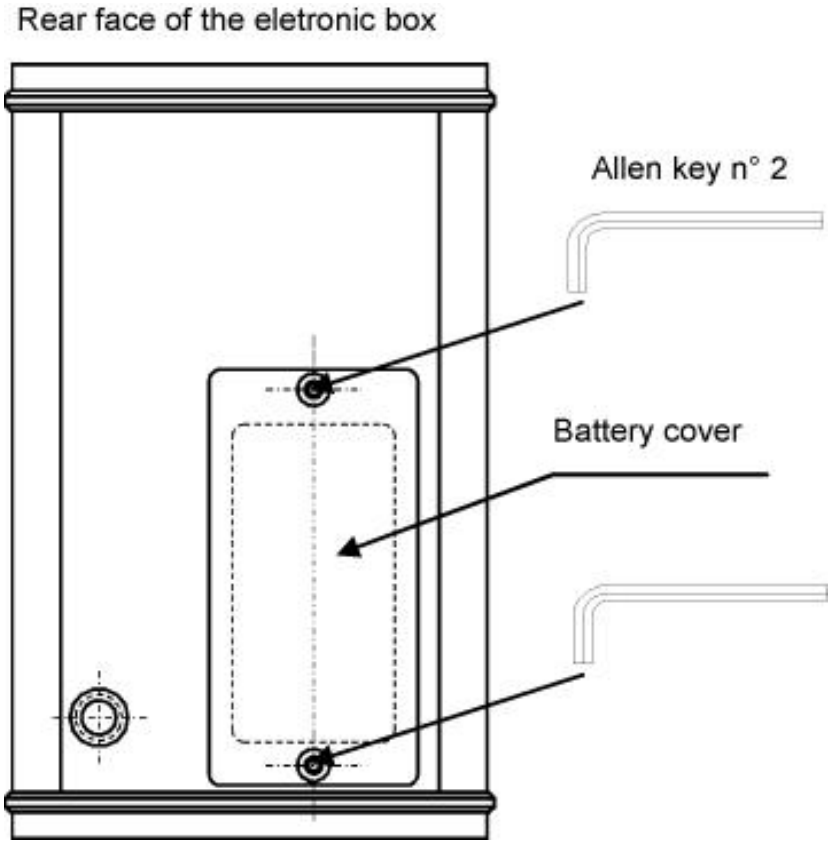


Figure 8

7.3 Changing the cable with cable holder assembly

The cable cannot be removed or dismounted from the frame. If the cable needs to be replaced it is therefore necessary to change the subassembly (cable + cable frame) as follows:

(1) Unscrew and remove the plug located on the front face of the electronic box.

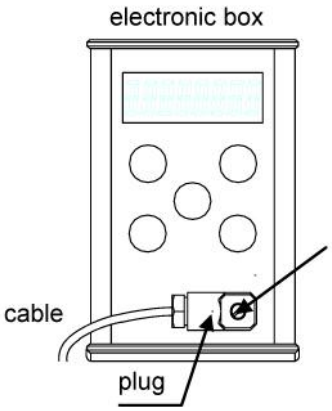


Figure 9

(2) Remove the electronic box from the holder by pressing on top of the rear of it, in order to clip it out of the frame.

(3) Unscrew and gently pull the connector from the sensor tube. See Figure 10.

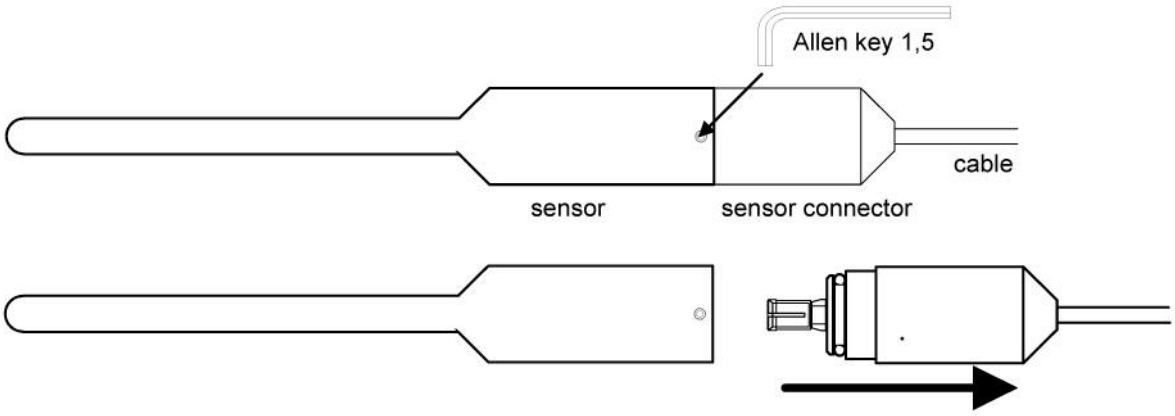


Figure 10

(4) On the new sub assembly (cable + frame) connect the cable to the sensor and tighten it with the screw.

(5) Mount the electronic box into the frame.

(6) Connect the plug to the electronic box and secure it with the screw.

(7) Switch the onecal on. The electronic circuit checks and compensates automatically the resistance of the new cable. Therefore changing the cable does not affect the calibration.

(8) Verify the correct functionning of the onecal by measuring a known temperature.

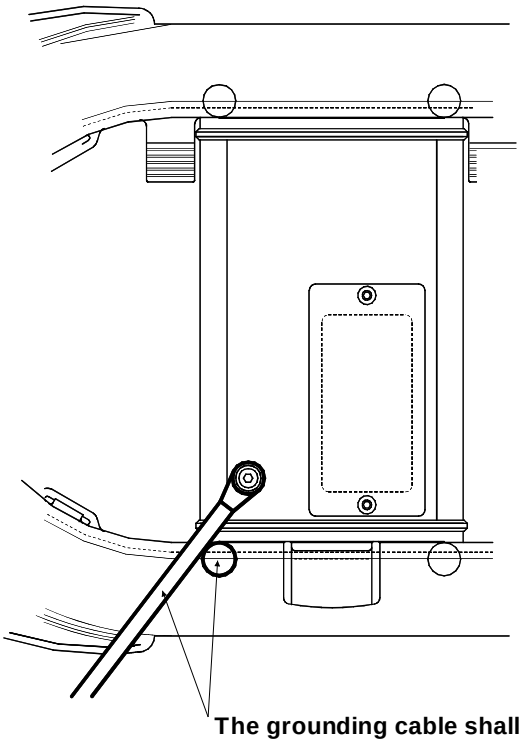
(9) The onecal is ready to work again.

7.4 Changing the sensor

(1) Unscrew and gently pull the connector from the sensor tube. See Figure 10.
(2) Connect the new sensor. Secure it with the screw.
(3) Carry out the one point verification as per 7.7.
(4) The onecal is ready to work again.

7.5 Changing the electronic box

(1) Unscrew and remove the grounding cable from the rear of the electronic box. See Figure 11.
(2) Unscrew and remove the plug located on the front face of the electronic box. See Figure 9.
(3) Remove the electronic box from the holder by pressing on top of the rear face, in order to clip it out of the frame.
(4) Clip the new electronic box into the frame.
(5) Connect the plug to the electronic box and secure it with the screw.
(6) Screw the grounding cable onto the correct location on the rear of the electronic box, as shown on Figure 11.



The grounding cable shall be held on the left of the plastic finger

Figure 11

(7) Check with an Ohmmeter the resistance between the grounding cable clip and the body of the temperature probe. It shall not exceed 10 ohm.
(8) Carry out the one point verification as per section 7.7.
(9) The onecal is ready to work again.

7.6 Temperature calibration

The onecal is calibrated at the factory, i.e. the temperature/resistance curve of all the specially selected Pt RTDs is digitally stored in every electronic box so no further calibration is required.
It is still necessary to check the onecal regularly for any drift of the offset.

7.7 *Verification & calibration of the offset*

7.7.1 A smart thermometer

The onecal is very user friendly and easy to calibrate.
Only one reference point is necessary to calibrate the instrument.
Moreover the onecal automatically checks the accuracy and stability of the reference temperature.
In other words the onecal will not accept a new calibration if the following conditions are not fulfilled:

- the measured reference temperature exceeds ± 0.2 °C
- the temperature stability exceeds ± 0.03 °C

During the calibration process the onecal keeps the previously recorded calibration data, so that in case of a procedural error it is always possible to revert to the previous calibration..

7.7.2 Equipment required

- A Dewar flask or any vacuum flask, approximately 8 cm in diameter and 36 cm deep.
- Ice, preferably made from distilled water.
- Water, preferably distilled and precooled.

7.7.3 Preparing the Ice Point bath

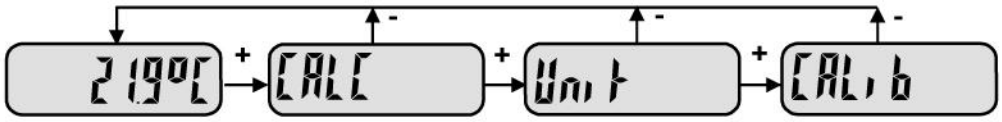
(1) Shave or crush the ice into small pieces, avoiding direct contact with the hands or any unclean object. The pieces shall be no more then 5 mm.
(2) Fill the Dewar flask with the crushed ice and add sufficient water to form a slush, just filling the voids between ice particles but not enough to float the ice.
(3) Insert the onecal sensor, packing the ice gently about it.
(4) Let it stand for half an hour to permit the sensor temperature, the ice particles and the water to equilibrate.
(5) As the ice melts it will be necessary to drain off some water and add more crushed ice. Gently stir the ice with the sensor periodically to assist equilibration.

IMPORTANT NOTE: Attention to detail during the preparation of the Ice Point bath is critical to the accuracy and quality of the offset calibration. Therefore be advised that the onecal will accept a new calibration only if the following conditions are fulfilled:

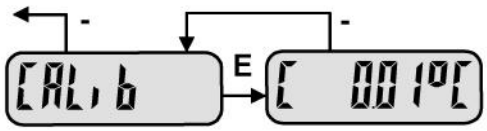
- **the proposed correction of the offset is within ± 0.2 °C (± 0.4 °F) compared to the true zero of the Pt-1000 resistance, and**
- **the stability of the temperature is within ± 0.03 °C (± 0.06 °F).**

7.7.4 Calibrating the thermometer

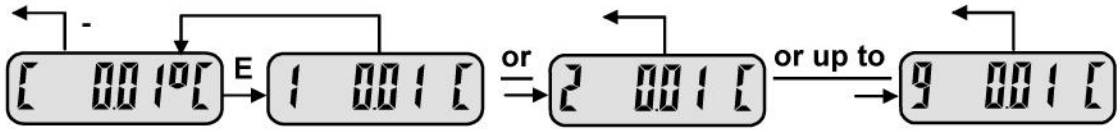
(6) After 30 minutes have elapsed, gently stir the bath with the sensor again to ensure complete equilibration of temperature.
(7) Switch on the onecal.
(8) Press "+" 3 times to call up the calibration menu.



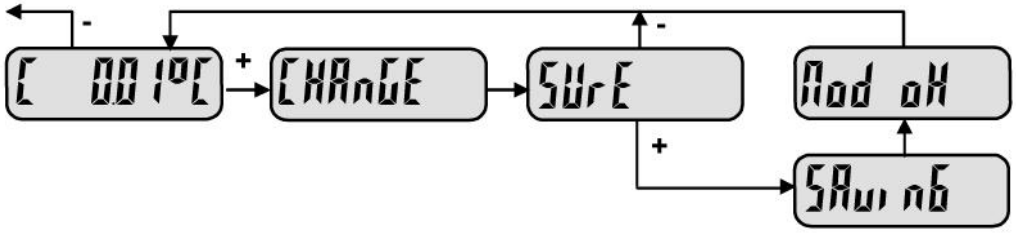
(9) Press "enter" to activate the function. When in this calibration routine the temperature is displayed to two decimal places of a degree.



(10) Observe the reading. The temperature must be stable, i.e. within ± 0.03 °C (± 0.06 °F).
(11) By pressing "enter", store at least 3 readings, up to 9. Wait 30 seconds between each reading in order to check the bath stability.



(12) When at least 3 individual readings are stored (but no more than 9), press "+" to activate the offset calculation process.
(13) To store the new offset correction press "+". The following sequences will be displayed during the process.

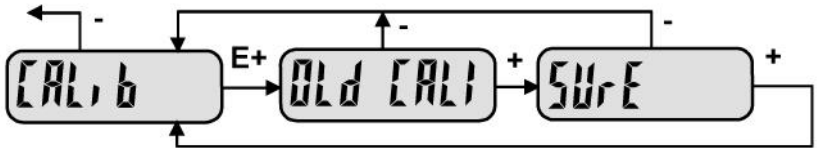


(14) Press "-" twice to go back to the measurement mode.
(15) If any other message is displayed refer to section 8.

7.7.5 Recovering the previous calibration data

If for any reason one wants to return to the previous calibration, this may be achieved from the calibration menu as follows:

(1) Press simultaneously the keys "enter" and "+", then "+", and "+".



7.8 Storage of HERMetic devices

For a proper storage of HERMetic products (UTImeter, Sampler, Thermometer and related spare-parts…), we recommend:

- Clean the devices after use,
- Remove batteries for prolonged storage,
- Store batteries in a dry and cold location,
- Store the goods in a safe, dry and dust free location with an ambient temperature between +5°C to +45°C.

7.9 Recycling of HERMetic devices

Equipment does not contain any dangerous materials inside which can harm the environment and people health during normal use or disposal. However the utilization and recycling of the equipment after the end of its life must be implemented by an authorized organization in accordance to local legislation.

Do not throw in rubbish but recycle wastes in accordance to environmental / local rules.

8. Trouble shooting

8.1 *Warning and error messages*

	(blinking message) The battery voltage is low, temperature readings are still valid, but the battery needs to be changed soon.
	The battery voltage does not guarantee the temperature integrity. Change the battery, ONLY IN A SAFE AREA.
	1) There is no probe or no cable attached to the onecal. **2) The probe or the cable is not properly installed. Check the connections.** **3) The probe or the cable is malfunctioning. Check for kinks, breaks, etc.**
	The probe or cable is malfunctioning. Check the connections, and check the cable for mechanical damage.
	The current temperature is out of the onecal range, i.e. > 200 °C or > 392 ° F.
	The current temperature is out of the onecal range, i.e. < - 40 °C or < - 40° F.
	Not enough temperature readings stored during the calibration procedure.
	The temperature reference is out of range. Check the quality of the ice point bath. It should be (0.0 °C ± 0.2 °C), (32.0 °F ± 0.4 °F).
	The reference temperature is not stable enough. Check that the stability of the ice point bath is within (± 0.03 °C), (± 0.06 °F).
	You have pressed "enter" although the current temperature is out of the onecal range.
	The memory is full. To store other individual readings first delete some data or erase them all.
The onecal does not shut off and looks as locked on	**Press (-), then (+), the onecal returns in measurement mode.** **Press "off" again.** **If the problem persists, disconnect and reconnect the battery, only in a safe area.**
The onecal shuts off automatically	**There was no action on the onecal during the last 10 minutes. The onecal shuts off automatically to save the battery.**

9. Specification

General Specification

Guarantee	2 years
Measurement range	-40 °F to 325 °F / -40 °C to 163 °C
Sensor temperature range	-40 °F to 392 °F / -40 °C to 200 °C
Ambient temperature range	-20 °C to 40 °C
Resolution	0.1° or 0.01° selectable
Temperature scale	°F / °C, selectable
Accuracy	exceeds API MPMS Chapter 7
-40 °F to -22 °F / -40 °C to -30 °C	± 0.4 °F / 0.25 °C
-22 °F to 212 °F / -30 °C to 100 °C	± 0.2 °F / 0.1 °C
212 °F to 325 °F / 100 °C to 163 °C	± 0.4 °F / 0.25 °C
Repeatability	exceeds API MPMS Chapter 7
-40 °F to 325 °F / -40 to 163 °C	± 0.2 °F / 0.1 °C
Calibration	digital, one point only (ice point 32 °F / 0 °C)
Memory	up to 9 individuals
Display	LCD 8 digits, 10 mm character height
Power	approved 9 V battery
Battery saving	automatic shut off 10 minutes after latest action
Battery life	approx. 100 hours
Low battery indication	on LCD display
Overall dimensions length x width x depth	13.2 " x 8 " x 3.7 " / 336 mm x 202 mm x 94 mm
Weight with 75 ft / 22.8 m cable	< 3 lbs / 1.4 kg
Probe size	0.64 " / 16 mm diam., 6 " / 150 mm long
Probe material	Stainless steel 316L
Cable length	7ft / 2 m, 25 ft / 7.6 m, 50 ft / 15.2 m, 75 ft / 22.8 m, 110 ft / 33.5 m
Cable material	FEP jacket
Instrument protection	IP 54
Frame material	antistatic polyamide base
Electronic box material	coated aluminium
Temperature sensor	Pt-1000 RTD element
Maintenance	modular design / easy exchange of parts

Hazardous environments approvals

IECEx (International)	Ex ia IIB T4 Ga
ATEX (Europe)	II 1 G Ex ia IIB T4 Ga
FM Approvals (USA)	Class I, Division 1, Groups C&D, T4 Class I, Zone 0, AEx ia IIB T4
NEPSI (China)	Ex ia IIB T4 Ga
GOSGORTECHNADZOR (Russia)	0ExiaIIBT4X

Specification subject to change without notice.

10. Drawings

10.1 Flowchart

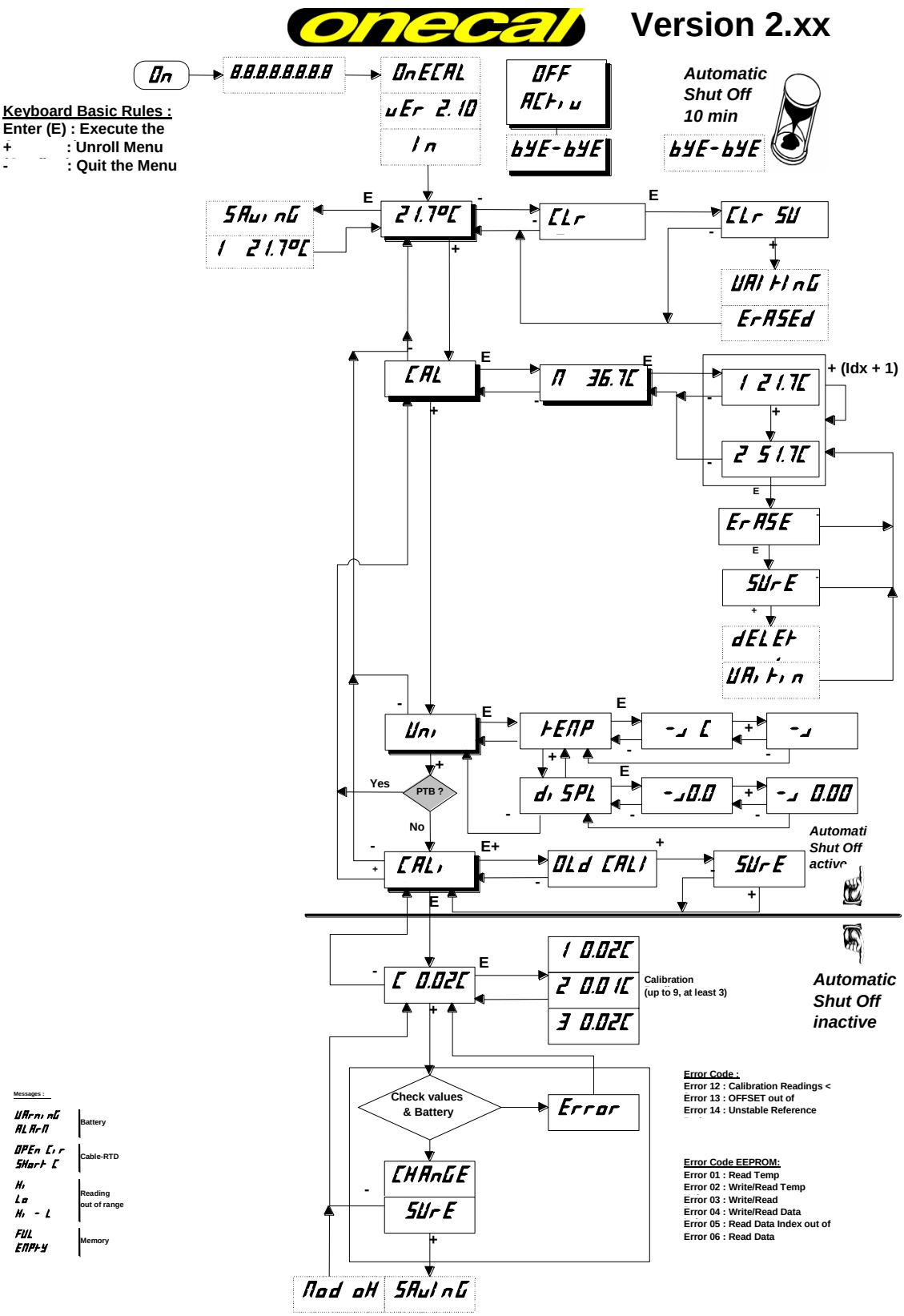


Figure 12

10.2 Spare parts

- ✓ When ordering spare parts please identify them by their description and TS number.
- ✓ Indicate the serial number and the year of production of the thermometer (printed on the rear of the electronic box).
- ✓ If the cable holder must be changed it is necessary to order **2x "half frame" TS 13035 and 4x rods TS 13049**.
- ✓ The cable is always delivered with the cable holder, this is to prevent damage. Check the cable length required and order accordingly.
- ✓ The carrying belt number is TS 13058.

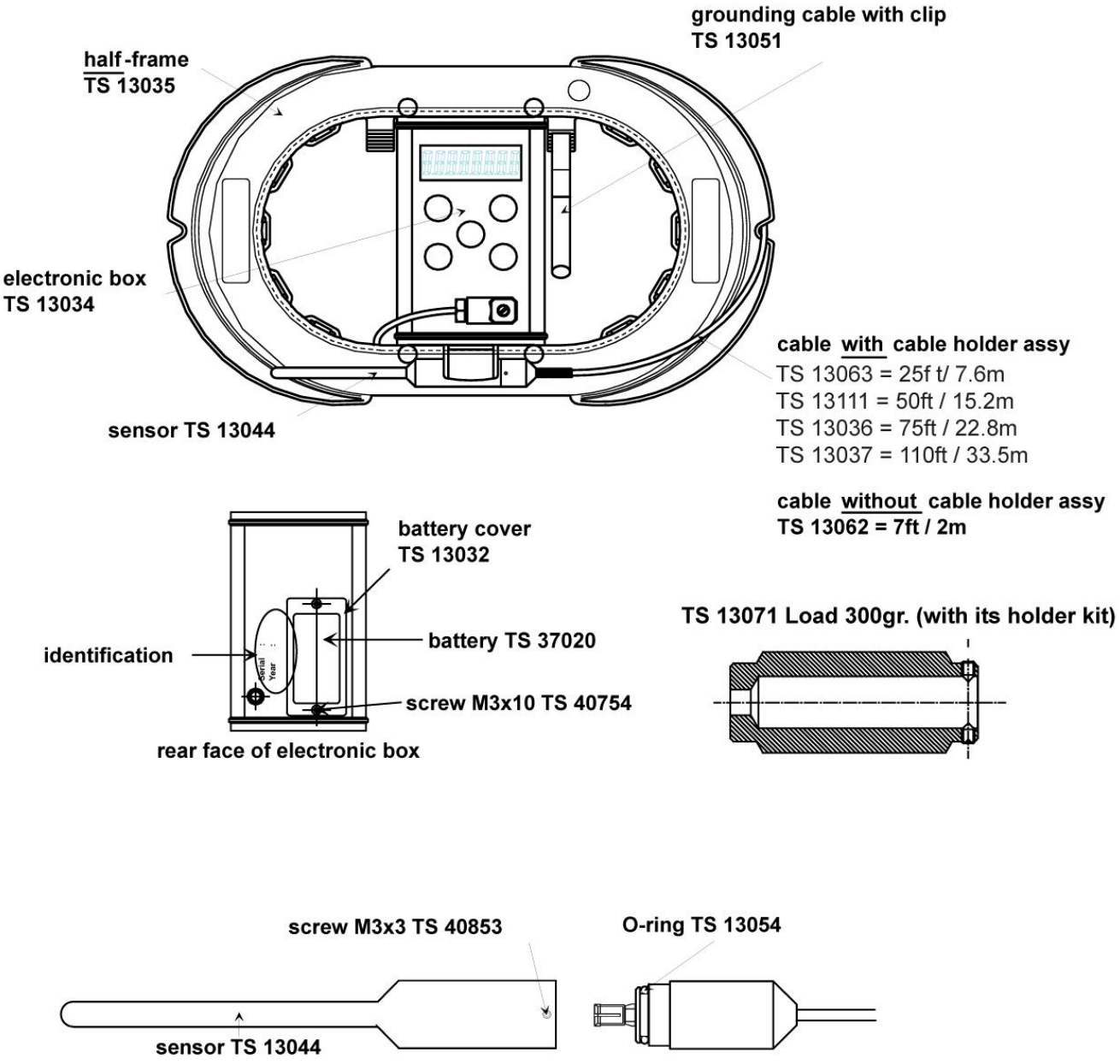


Figure 13

Apparatus Identification **HERMetic Onecal, Portable Digital Thermometer**

Apparatus Classification Measurement Equipment

Statement of Conformity

Based on sample product test results using appropriate standards (industrial environment), and in accordance with the following EC Directives, we, Enraf Tanksystem SA, hereby declare under our sole responsibility that the Hermetic onecal is in conformity with:

EC ATEX Directive 94/9/EC, Equipment and protective systems intended for use in potentially explosive atmospheres.
EC Type Examination Certificate: BAS 00ATEX1014X/1 II 1 G Ex ia IIB T4 Ga

EC Directive 89/336/EEC, Electromagnetic Compatibility.

IEC 60079, Electrical apparatus for explosive gas atmospheres.
IEC Type Examination Certificate: IECEx BAS 12.0031X Ex ia IIB T4 Ga

Sample Product Testing for ATEX / IECEx

Tested by	Baseefa Rockhead Business Park, Staden Lane, Buxton, Derbyshire, SK17 9RZ. United Kingdom
ATEX Standards Used	IEC60079-0:2011, Explosive atmospheres - Part 0: Equipment - General requirements EN60079-11:2012, Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Report ID	GB/BAS/ExTR12.0134/00
IECEx Standards Used	IEC60079-0:2011, Explosive atmospheres - Part 0: Equipment - General requirements IEC60079-11:2011, Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Report ID	GB/BAS/ExTR12.0134/00
Quality Assurance notification	Baseefa ATEX 1536
IECEx Quality Assessment Report	GB/BAS/QAR06.0079/02
Notified Body	Baseefa, Rockhead Business Park, Staden Lane, Buxton, Derbyshire, SK17 9RZ. United Kingdom
Notified Body Number	1180

Sample Product Testing for EMC

Tested by	Montena EMC SA Zone industrielle de Montenaz CH-1728 ROSSENS / Switzerland
Standards Used	EN 61326-1, (1998) Electrical equipment for measurement, control and laboratory use - EMC requirements
Report ID	Report no. 12'195 EMC tests on a portable digital thermometer Hermetic Onecal according to EN 61326-1

Manufacturer

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CH-1630 BULLE
Switzerland

Philippe Despagne
General Manager